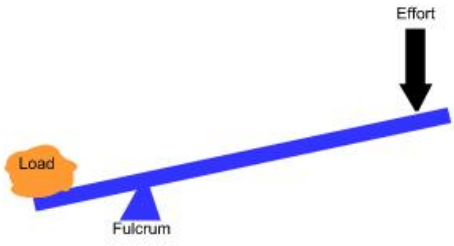
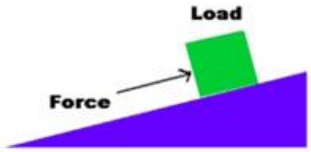
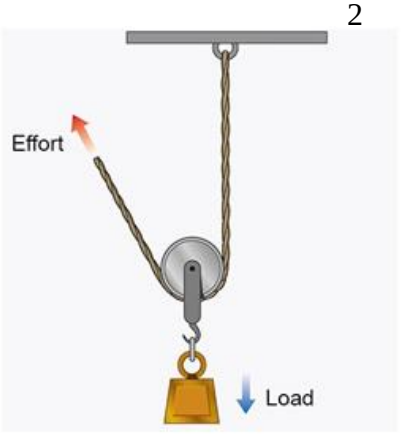
Work, Power, and Machines

Notes

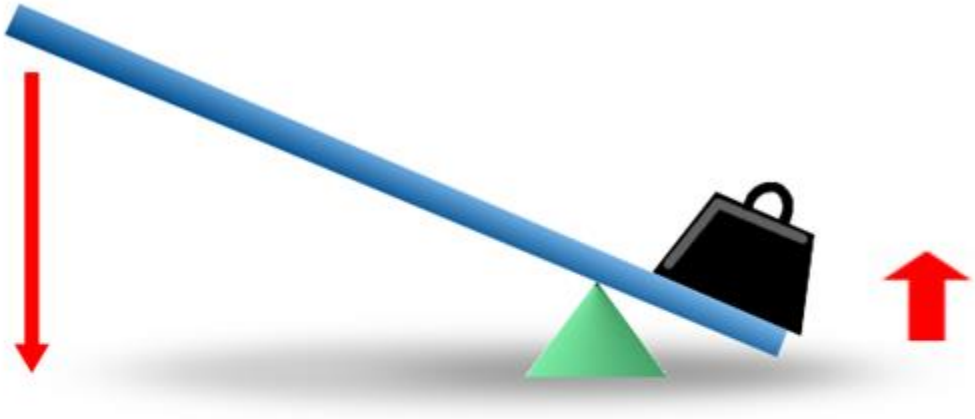
Learning Objective:	**Through speaking and writing, SWBAT define simple machines, and explain how they make work easier, using academic language.**
Simple machine	a device that makes work easier Machines make work easier by changing the: •size of a force •direction of a force •distance of a force They DO NOT change the amount of work
Distance and force	less force is needed when the distance increases more force is needed when the distance decreases
Load	the object to be moved by a simple machine







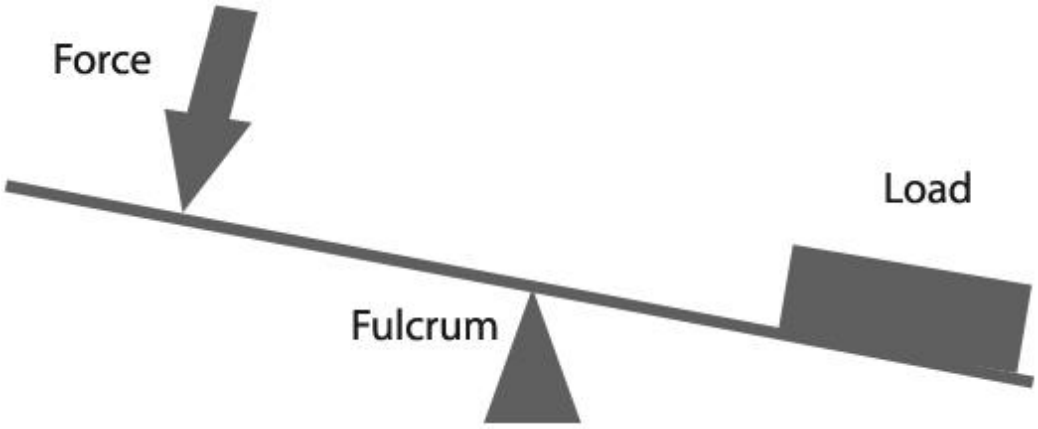
Learning Objective:	**Through speaking and writing, SWBAT describe the six types of simple machines, and explain how they make work easier, using academic language.**
6 types of simple machines	•lever •pulley •inclined plane •wedge •screw •wheel and axle
Lever	a bar that turns around a fixed point
What a lever does	lifts or moves loads
How a lever makes work easier	•changes the distance of the force •changes the direction of the force



Examples of levers

- crowbar
- see-saw
- car jack

Fulcrum — a fixed point around which a lever turns

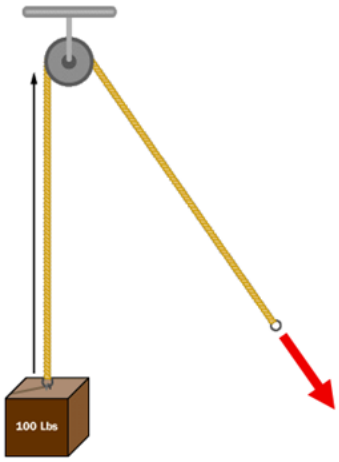


http://www.brainpop.com/science/motionsforcesandtime/levers/

Pulley — a rope wrapped around a wheel

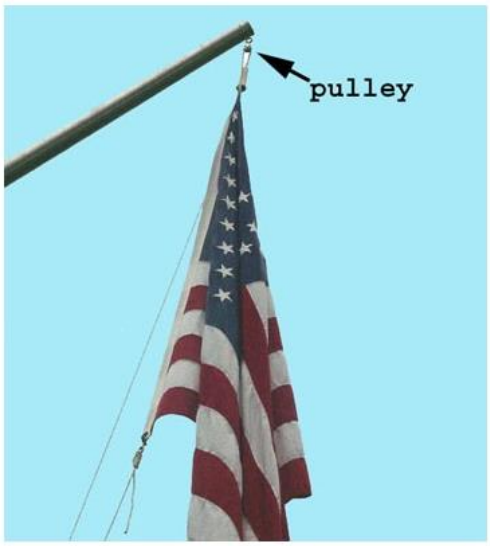
What a pulley does — raises or lowers a load

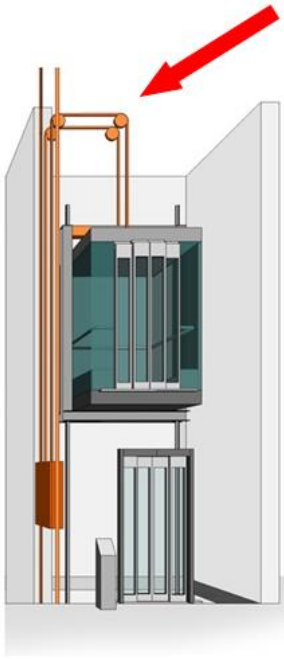
How a pulley makes work easier — changes the direction of a force



PULLEY

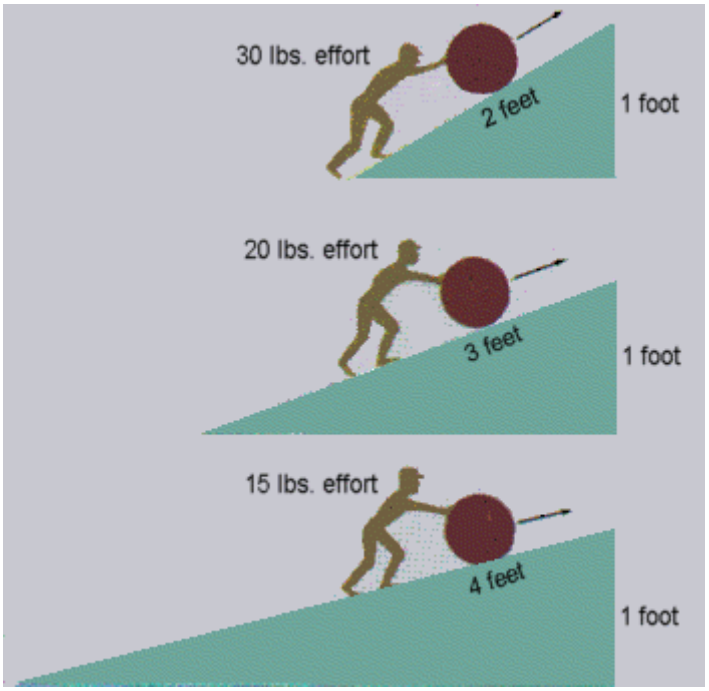
Examples of pulleys	•elevator •flag pole •crane





http://www.brainpop.com/technology/simplemachines/pulley/

Inclined plane	a flat surface raised at an angle
What an inclined plane does	connects a lower level to a higher level
How an inclined plane makes work easier	less force is used over a greater distance

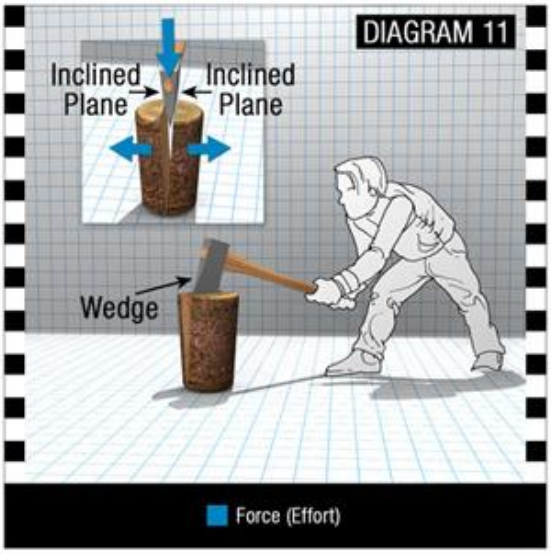


Examples of inclined planes

- ladder
- ramp
- stairs
- slide

Wedge two inclined planes put together

What a wedge does — separates or cuts objects



How a wedge makes work easier — changes the direction of a force

Examples of wedges

- axe
- nail
- knife

Knife

Axe

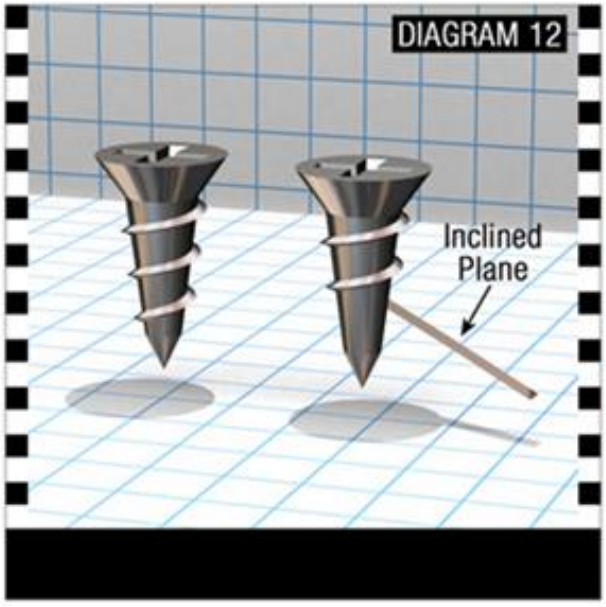
Nail

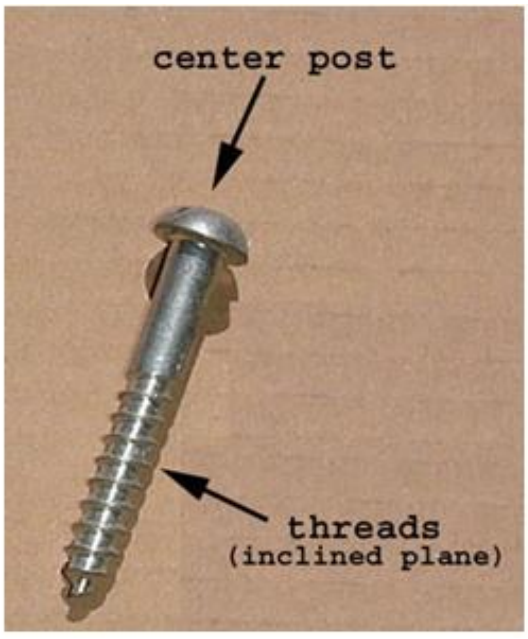
Needle

Screw — an inclined plane wrapped around a central core

The inclined plane makes up the *threads* of the screw

What a screw does — lifts materials

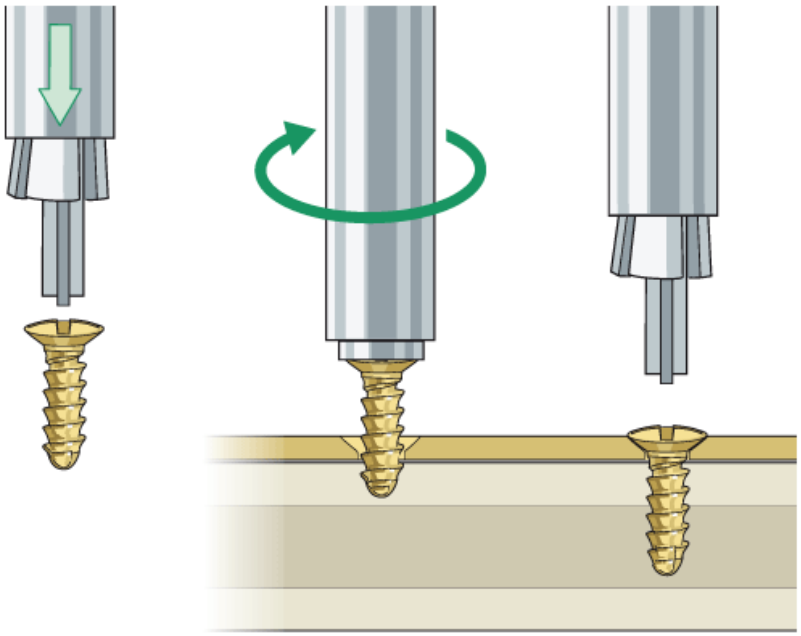


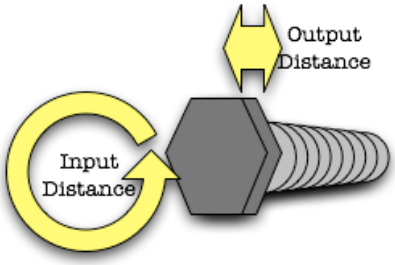


How a screw makes work easier

•changes the size of a force
•changes the direction of a force

Less force is applied as you turn the screw over a longer distance

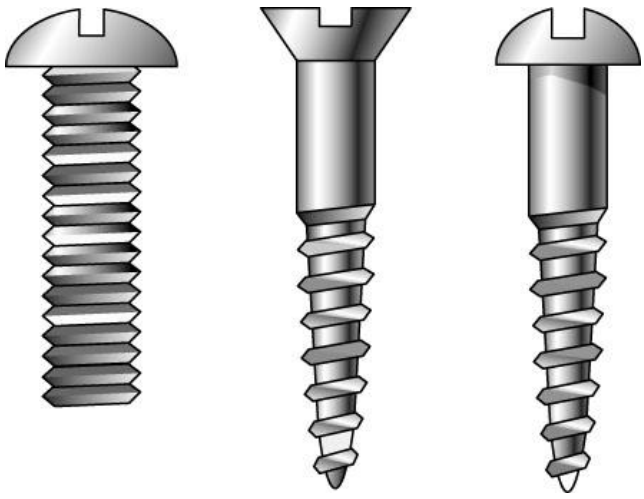




Distance between threads of a screw

determines the amount of force needed:

closer threads = less force
wider threads = more force

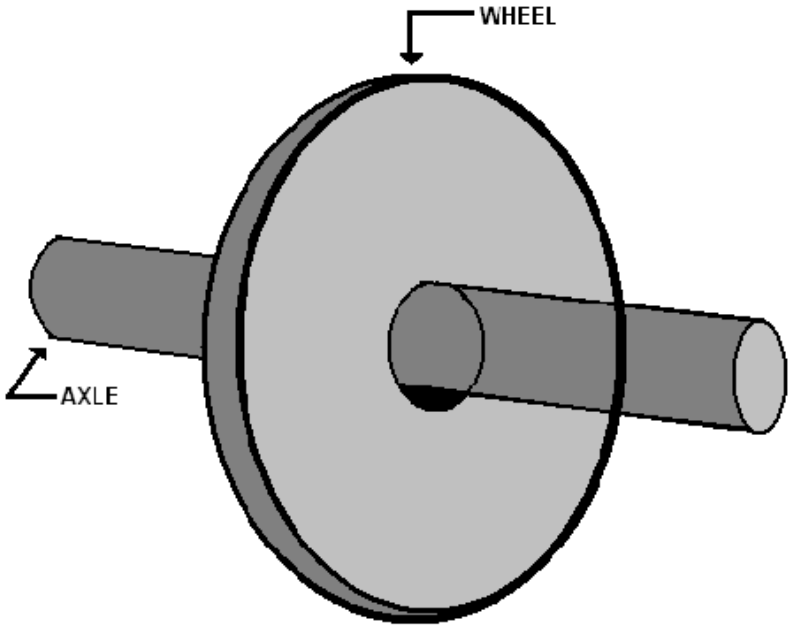


Examples of screws

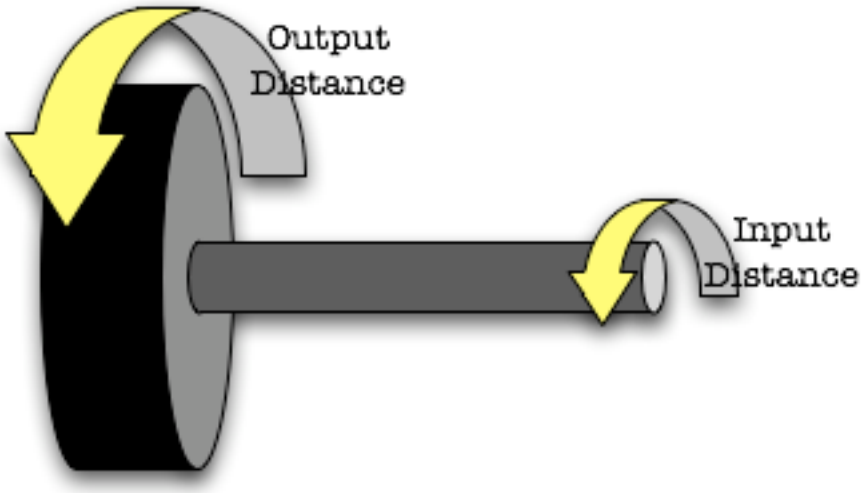
- bottles and jars
- light bulb
- bolt

http://www.brainpop.com/technology/simplemachines/inclinedplane/

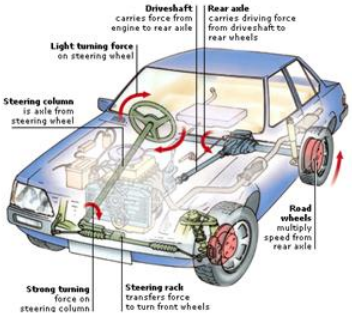
Wheel and axle a large circular object attached to a bar

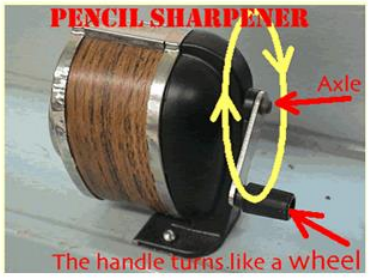


What a wheel and axle does	moves loads
How a wheel and axle make work easier	less force is used over a greater distance
	Turning the wheel increases the distance more than just turning the axle



Examples of wheel and axle	•doorknob •steering wheel •wrench •Ferris wheel •pencil sharpener





http://www.brainpop.com/science/motionsforcesandtime/wheelandaxle/

Work, Power, and Machines
Check Your Understanding

Page 195

1. How many types of simple machines do you see in the pictures?	*There are _____ simple machines in the pictures.*
2. What kind of simple machine is a seesaw?	*A seesaw is a _____ .*
3. How do machines make work easier?	*Machines make work easier by _____ .*
4. How did a simple machine you used make work easier?	*I used _____ , which is an example of a _____ , to _____ . It made work easier by _____ .*

Learning Objective: **Through speaking and writing, SWBAT define work and explain how work is calculated, using academic language.**

Work using force to move an object a certain distance

Formula for work Work = force × distance

w = f × d

Work, Power, and Machines
Science Skill
Page 196

1. Which person is moving the box the greater distance?

Person _____ is moving the box the greater distance.

2. Which person is using the most force?

Person _____ is using the most force.

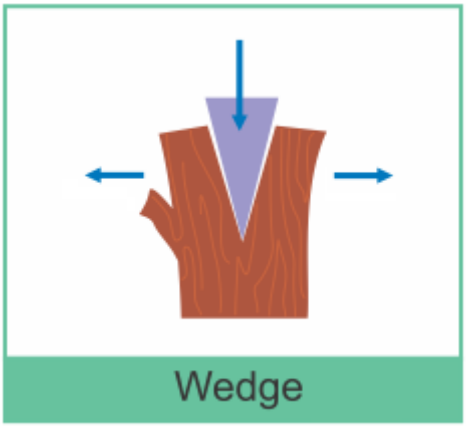
3. Is person A doing less work than person B? How do you know?

Person A _____ doing more work than Person B. They are both _____ . Person A is using _____ , but has to _____ .

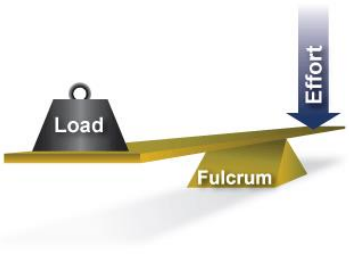
Wedge is thick at one end and thin at the other

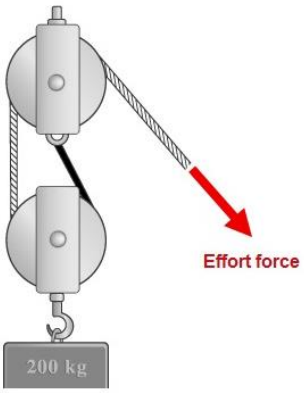
It changes the direction of a force

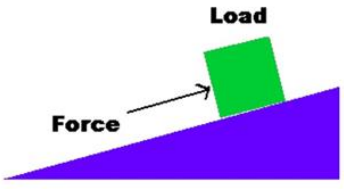
To use a wedge	put the thin end on the object you want to separate Apply an effort force to the thick edge to move the wedge downward The wedge pushes sideways and splits the object apart



Effort force	a force that moves an object



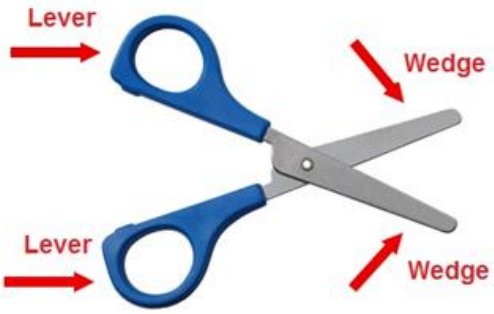


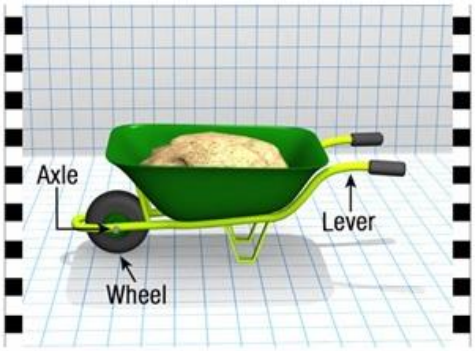


Compound machine — a machine made of two or more simple machines

It makes work even easier than a simple machine

You use less force to do the same work





Examples of compound machines

- scissors (wedge; lever)
- wheelbarrow (lever; wheel and axle)
- shovel (wedge; lever)

Work, Power, and Machines
Check Your Understanding

Page 197

1. Why does an inclined plane make work easier?

An inclined plane makes work easier because _____ .

2. What can you use a wedge to do?

You can use a wedge to _____ .

3. What is a compound machine?

A compound machine is a _____ .

4. What kind of simple machine are the blades of scissors? How do the blades help make work easier?

The blades of a scissors are a _____ . The blades help make work easier because _____ .